

REMARKS

Upon entry of the present amendment, claims 1-2, 5, 9 and 11-14 will remain pending in the above-identified application and stand ready for further action on the merits.

The amendments made herein to the specification and claims do not incorporate new matter into the application as originally filed.

For example, the amendments to the paragraphs beginning on pages 3 and 5 simply correct typographical errors, wherein the specification (and even claim 1) erroneously referred to "sulfonyl group and carbonyl group" when referencing Ar<sup>1</sup> and Ar<sup>2</sup> and Formula (I). In reality, these groups should have been referred to as a "sulfo group" which is, SO<sub>3</sub>H and "carboxyl group".

Regarding the amendment to page 36, the following is noted. The amendment made herein to the specification at page 36 does not incorporate new matter into the application as originally filed. Instead, the amendment is simply made in order to correct a typographical error that occurred when preparing the original English translation from the Japanese priority document 2000-210999 filed on July 12, 2000 in the Japanese patent office.

In support of the instant amendment to page 36, Applicants also note that support for the amendment occurs at page 2, line 21 of the present application.

Further, Applicants enclose herewith an English translation of paragraphs [0064] to [0068] of the original Japanese priority document 2000-210999, wherein paragraph [0067] supports the amendment made at page 36. In this respect, acrylonitrile-butadiene-styrene copolymer was utilized in each of Examples 7-9. For the Examiner's convenience, copies of paragraphs [0059] to [0069] of the original Japanese priority document are also provided herewith.

Regarding the amendments to the claims, the following is noted. Original claim 9 has now been incorporated into claim 1. Newly added claims 11-14 find support in original claim 9, but do not recite the substituent group "aralkyl". Additionally, it is noted that support for the amendments to the claims can be found at page 8, line 21 to page 9, line 5, page 13, lines 16-17, and page 14, lines 7-8.

Accordingly, entry of the present amendment is respectfully requested.

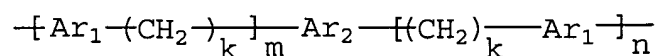
***Examiner Interview***

Applicants appreciate the Examiner's courtesy in granting an interview on January 28, 2004. The Examiner's comments in the interview summary form resulting from the interview are correct with regard to the substance of the matters discussed in the interview.

**Claim Rejection Under 35 USC § 103(a)**

Claims 1, 2, 5 and 9 are rejected under 35 USC § 103(a) as being unpatentable over Chuchin et al. (US 4,104,244) taken in view of Avakian et al. (US 6,214,915). Reconsideration and withdrawal of this rejection is respectfully requested based on the following considerations.

Chuchin et al. discloses, at lines 47 to the bottom of column 1, poly(arylene alkylenes) having the general formula:



The disclosed formula represents a polymer containing, as repeating unit, two arylene moieties which are connected to a aryl moiety via a methylene or ethylene linkage.

In Table 1 on column 4 of Chuchin et al., the third column of the table reads "m + n is 8", and Ar<sub>1</sub> is a phenyl group as depicted at lines 20 to 25 on column 3. Examples 1 to 10, column 3 disclose the preparation of the polymer using benzyl halide and Ar<sub>2</sub>. The disclosure of Chuchin et al. discloses a general formula and some compounds falling within the scope thereof in its Examples, but it does not specifically disclose nor teach 9,10-dihydroanthracene nor 9,10-dihydroanthracene substituted with the groups recited in the present claims.

Chuchin et al. may disclose that the polymer stabilizers depicted above can be used for vinyl polymers, but it does not

disclose any polymers having butadiene monomers to which the stabilizers are applied.

The USPTO asserts that it would be *prima facie* obvious to utilize these stabilizers in the polymers given the art recognized functionality of these stabilizers and their use in a wide variety of vinyl polymers. The Applicants respond as follows to the USPTO's assertions.

Art recognized functionality of these stabilizers is directed to only vinyl polymers, which are outside the scope of the polymers having butadiene monomers. The Office Action indicates that the Chuchin et al. patent is extensive in its discussion of utilizing these compounds as stabilizers in vinyl polymers.

Vinyl polymers as mentioned generally do not have an unsaturated bond within the formed polymer chain, however, polymers having butadiene monomers will have an unsaturated bond within the formed polymer chain. As such, vinyl polymers are distinct from polymers having butadiene monomers.

In addition, there is nothing in Chuchin et al. to suggest the linkage between the vinyl polymers and the polymers having butadiene monomers.

Avakian et al. contemplates aromatic ketone stabilizers. Although a large number of polymers are disclosed from col. 9 to col. 12 thereof, only a few specific stabilizers for only polypropylene are specifically taught or realized therein, e.g.,

calcium stearate is utilized as a stabilizer with a polypropylene resin as stated at col. 23, lines 45-47 (also see the Examples of columns 22-23 of Avakian et al.).

Avakian et al. may teach a certain similar compound to that of Chuchin et al., however, the former do not teach extensive use of the similar compound *per se* to a wide variety of polymers.

In addition, it is generally understood and recognized that polypropylene is a different type of polymer from polymers having/containing butadiene monomer. The problems to be solved by Avakian et al. are solved by its finding of aromatic ketone as stabilizer compounds. Hence, Avakian et al. do not suggest or motivate one of ordinary skill in the art to use a stabilizer as recited in the present claims with a polymer having/containing butadiene monomers.

Accordingly, the combined teachings of Chuchin et al. and Avakian et al. do not provide any motivation for one ordinary skill in the art to use the stabilizers recited in the present claims to apply to polymers having butadiene. Absent such motivation in the cited art, the outstanding rejections under 35 USC § 103(a) are not sustainable. This is true whether the cited art references are considered singularly or in combination.

In view of the above, the presently claimed composition is not obvious over Chuchin et al., taken in view of Avakian et al.

CONCLUSION

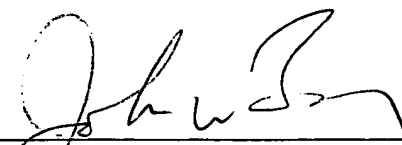
Based upon the amendments made herein and the remarks presented, the Examiner is respectfully requested to issue a Notice of Allowance indicating that each of the pending claims 1-2, 5, 9 and 11-14 are allowed and patentable under the provisions of Title 35 of the United States Code.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact John W. Bailey (Reg. No. 32,881) at the telephone number below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By   
John W. Bailey, #32,881

P.O. Box 747  
Falls Church, VA 22040-0747  
(703) 205-8000

JWB/enm  
2185-0555P

Enclosures: Portion of JP 2000-210999, and partial English translation of the same.



【0066】

【表1】

	実施例	実施例	実施例	実施例	実施例	実施例	比較例
化合物(I)	1	2	3	4	5	6	1
使用量							
化1	0.1	—	—	—	—	—	—
化2	—	0.1	—	—	—	—	—
化3	—	—	0.1	—	—	—	—
化4	—	—	—	0.1	—	—	—
化5	—	—	—	—	0.1	—	—
化6	—	—	—	—	—	0.1	—
MFR							
(g/10分)	39	34	39	35	34	38	4

【0067】

実施例7～9

アクリロニトリル-ブタジエンスチレン共重合体樹脂〔MFRは13.3g/10分〕100重量部に化合物(I)として9,10-ジヒドロアントラセン(化1、実施例7)、キサントレン(化3、実施例8)またはアントロン(化6、実施例9)を0.1重量部加え、30mmφの一軸押出機を用いて240℃で熔融混練して、ブタジエン系重合体組成物のペレットを得た。このペレットを熱風乾燥した後、5.5oz射出成形機を用いて245℃に加熱し、直ちに成形して耐衝撃試験用のアイゾット試験バー(厚みは4mm)を得、JIS K 7110に準拠してアイゾット衝撃試験値(Izod)を測定し、これを滞留前のIzod(単位はkg・cm・cm)とした。同時に射出成形機内で245℃で熔融混練しながら15分後に成形して同様のアイゾ



[0064]

#### Examples 1-6

To 100 parts by weight of styrene-butadiene block copolymer [melt-flow rate(MFR): 13.3 g/10 minutes], 0.1 part by weight of 9,10-dihydroanthracene(compound 1, Example 1), 10,11-dihydro-5H-dibenzo[a,d]cycloheptene (compound 2, Example 2), xanthene(compound 3, Example 3), 9-xanthenone(compound 4, Example 4), anthraquinone(compound 5, Example 5), or anthrone(compound 6, Example 6) was added respectively as Compound (I), and the mixture was melt-kneaded at 200°C with 30 mm $\phi$  mono-axial extruder to obtain pellets of the polybutadiene composition, and MFR of the pellets was measured. The results are shown in Table 1.

MFR was measured with a melt indexer [L246-2531, manufactured by Techno Seven Co.] at the holding time of 15 minutes, at the temperature of 245°C, and at the load of 2160 g. The smaller MFR at the holding time of 15 minutes indicates the less thermal degradation and cross-linked matter.

[0065]

#### Comparative example 1

Styrene-butadiene block copolymer as used in Examples 1-6 was palletized and MFR at the holding time of 15 minutes was measured in a similar manner as in Examples 1-6. The results are shown in Table 1.

[0066]





Table 1

Compound (I)	Example No.						Comparative Example 1
	1	2	3	4	5	6	
Amount of the Compound (I)							
Compound 1	0.1	-	-	-	-	-	-
Compound 2	-	0.1	-	-	-	-	-
Compound 3	-	-	0.1	-	-	-	-
Compound 4	-	-	-	0.1	-	-	-
Compound 5	-	-	-	-	0.1	-	-
Compound 6	-	-	-	-	-	0.1	-
MFR (g/10minutes)	39	34	39	35	34	38	4

[0067]

## Examples 7-9

To 100 parts by weight of acrylonitrile-butadiene-styrene copolymer [MFR: 13.3 g/10 minutes], 0.1 part by weight of 9,10-duhydroanthracene(compound 1, Example 7), xanthene(compound 3, Example 8), or anthrone(compound 6, Example 9) was added as Compound (I), and the mixture was melt-kneaded at 240°C with 30 mm $\phi$  mono-axial extruder to obtain pellets of the polybutadiene composition, which were then dried with hot air.

Immediately after the pellets thus obtained were heated to 245°C, molding was conducted with 5.50z injection molder to obtain an Izod test bar having a thickness of 4 mm for impact test. According to JIS K 7110, impact resistance value(Izod) was measured and was referred to as "Izod(unit: Kg·cm·cm) before holding".

The same procedure as above was repeated except that the molding was conducted not immediately after but after 15 minutes of melt-kneading at 245°C in the same injection molder, and Izod test bar was obtained and Izod impact resistance value was measured in a similar manner. The measured values were referred to as "Izod (unit: Kg·cm·cm) after holding". The smaller Izod

at the holding time of 15 minutes indicates the less thermal degradation and cross-linked matter.

[0068]

Comparative example 2

Acrylonitrile-butadiene-styrene copolymer as used in Examples 7-9 was pelletized, and Izod before and after holding was measured. The results are shown in Table 1.

[0069]

Table 2

Compound (I)	Example No.			Comparative Example 2
	7	8	9	
Amount of the Compound (I)				
Compound 1	0.1	-	-	-
Compound 3	-	0.1	-	-
Compound 6	-	-	0.1	-
Izod				
Before holding	24.6	24.8	25.1	22.7
After holding	18.1	18.5	20.1	15.6

The unit of Izod is (Kg·cm·cm).

合にはこれに化合物 (I) を分散または溶解させてもよい。

【0059】

かかるブタジエン系重合体組成物において、化合物 (I) はブタジエン重合体の熱劣化を防止し、該重合体を安定化させているので、ブタジエン系重合体に化合物 (I) を含有させる方法はブタジエン系重合体の安定化方法として有用である。かかる安定化方法において、化合物 (I) の使用量はブタジエン重合体組成物におけると同様に通常 0.01 重量部程度以上、好ましくは 0.05 重量部程度以上であり、通常 10 重量部程度以下、好ましくは 5 重量部程度以下である。

【0060】

また化合物 (I) はブタジエン系重合体の熱劣化を防止するブタジエン系重合体の安定化剤として有用である。かかる安定剤は化合物 (I) からなるものとなるが、前記したと同様の酸化防止剤や添加剤を含有していてもよい。

【0061】

本発明のブタジエン系重合体組成物は、ブタジエン系重合体の熱劣化が防止されているので、各種成形品、例えばホース、履物、玩具、フィルム、各種容器などの射出成形品、押出成形品、ブロー成形品などに成形する際の架橋物の発生が少なく、より外観に優れた成形品とすることができる。

【0062】

【発明の効果】

本発明のブタジエン系重合体組成物によれば、空気が遮断された環境におけるブタジエン系重合体の架橋を防止できる。

【0063】

【実施例】

以下、実施例により本発明をより詳細に説明するが、本発明はこれら実施例に限定されるものではない。

【0064】

実施例 1～6

スチレン-ブタジエンブロック共重合体樹脂〔メルトフローレート (MFR) は 13.3 g/10 分〕 100 重量部に化合物 (I) として 9, 10-ジヒドロ

アントラセン（化1、実施例1）、10, 11-ジヒドロ-5H-ジベンゾ[a, d]シクロヘプテン（化2、実施例2）、キサントレン（化3、実施例3）、9-キサントノン（化4、実施例4）、アントラキノ（化5、実施例5）またはアントロン（化6、実施例6）を0.1重量部加え、30mmφの一軸押出機を用いて200℃で熔融混練して、ブタジエン系重合体組成物のペレットを得、このペレットのMFRを測定した。評価結果を表1に示す。

なお、MFRは、メルトインデクサー〔テクノセブン社製、「L246-2531」〕を用いて245℃で、荷重2160g、滞留時間15分におけるMFRを測定した。滞留時間15分におけるMFRが小さいほど、熱劣化が少なく架橋物が少ないことを示す。

#### 【0065】

##### 比較例1

実施例1～6で用いたと同様のスチレン-ブタジエンブロック共重合体樹脂をペレットとし、実施例1～6と同様にして滞留時間15分におけるMFRを測定した。評価結果を表1に示す。

【0066】

【表1】

	実施例	実施例	実施例	実施例	実施例	実施例	比較例
化合物(I)	1	2	3	4	5	6	1
使用量							
化1	0.1	—	—	—	—	—	—
化2	—	0.1	—	—	—	—	—
化3	—	—	0.1	—	—	—	—
化4	—	—	—	0.1	—	—	—
化5	—	—	—	—	0.1	—	—
化6	—	—	—	—	—	0.1	—
MFR							
(g/10分)	39	34	39	35	34	38	4

【0067】

#### 実施例7～9

アクリロニトリル—ブタジエ—スチレン共重合体樹脂〔MFRは13.3g／10分〕100重量部に化合物(I)として

9, 10—ジヒドロアントラセン(化1、実施例7)、キサンテン(化3、実施例8)またはアントロン(化6、実施例9)を0.1重量部加え、30mmφの一軸押出機を用いて240℃で熔融混練して、ブタジエン系重合体組成物のペレットを得た。このペレットを熱風乾燥した後、5.5Oz射出成形機を用いて245℃に加熱し、直ちに成形して耐衝撃試験用のアイゾット試験バー(厚みは4mm)を得、JIS K 7110に準拠してアイゾット衝撃試験値(Izod)を測定し、これを滞留前のIzod(単位はkg・cm・cm)とした。同時に射出成形機内で245℃で熔融混練しながら15分後に成形して同様のアイゾ

ット試験バーを得、同様にアイゾット衝撃試験値を測定し、これを滞留後の I z o d (単位は  $\text{kg} \cdot \text{cm} \cdot \text{cm}$ ) とした。滞留前の I z o d と滞留後の I z o d との差が小さいほど、熱劣化が少なく架橋物の発生が少ないことを示す。

【0068】

比較例 2

実施例 7～9 で用いたアクリロニトリル-ブタジエンスチレン共重合体樹脂をそのままペレットとし、実施例 7～9 と同様にして滞留前の I z o d と滞留後の I z o d とを測定した。評価結果を表 1 に示す。

【0069】

【表 2】

	実施例	実施例	実施例	比較例
化合物 (I)	7	8	9	2
使用量				
化 1	0.1	—	—	—
化 3	—	0.1	—	—
化 6	—	—	0.1	—
I z o d				
滞留前	24.6	24.8	25.1	22.7
滞留後	18.1	18.5	20.1	15.6

I z o d の単位は、( $\text{kg} \cdot \text{cm} \cdot \text{cm}$ )